Instructor:	Dr. Richard Shadrach	**Time:**	MWF 11:00-11:50AM
Office:	214 Herman Brown Hall	**Classroom:**	453 Herman Brown Hall
Email:	shadrach@rice.edu	**Office Hours:**	W 4-5, Th 2:30-3:30, F 3:30-4:30 (and by appointment)

Course Webpage: Look for Math 464 001 Sp15 on Owlspace

Texts: *Introduction to Commutative Algebra*, M.F.Atiyah and I.G. MacDonald.
Commutative Algebra: with a View Toward Algebraic Geometry, David Eisenbud

Homework: Homework is due every week on **Monday at the start of lecture**. Homework is a key part of this course and you should expect to spend a significant amount of time on it. The homework is not pledged and you are encouraged to collaborate with other students in the class. However, your solutions must be **written up individually**.

Undergraduates enrolled in Math 464 will have a reduced homework load. Mathematics graduate students should enroll in Math 564.

Exams: There will be a take-home midterm exam due the week of **February 23rd** and a takehome final exam due during the exam period no earlier than the Registrar's Office scheduled final exam.

> **Warning:** It is the policy of the Mathematics Department that no final may be given early to accommodate student travel plans. If you make travel plans that later turn out to conflict with the scheduled exam, then it is your responsibility to either reschedule your travel plans or take a zero in the final.

If an exam conflicts with a holiday you observe, please let me know now.

Grades: Homework will count for 50% of your grade. While homeworks will differ in the number of points, their scores will be normalized so that they each contribute the same amount to the overall homework grade. The midterm will count for 20% and the final will count for 30%.

Attendance: Attendance, while strongly recommended, is not required and is not a factor in determining your grade. A missed homework or exam will count as a zero.

Expectations: Abstract Algebra III is in many ways similar to a language course. There are many definitions and objects that we will study, each with their own behaivor and properties. In order to fully internalize these, a lot of hands on practice is required. By the end of the course a successful student will be able to think conceptually and work technically with these mathatmical ideas.

Disability Support: Any student with a documented disability seeking academic adjustments or accommodations is requested to speak with me during the first two weeks of class. All such discussions will remain as confidential as possible. Students with disabilities will need to also contact Disability Support Services in the Allen Center.

Topics to be covered:

1. **Category theory:** Definitions, examples. Equivalences of categories. Adjoint functors. Representable functors and the Yoneda Lemma. Products, coproducts, fibered products. Universal properties. Limits.
2. **Commutative Algebra:** Some ideal theory beyond Math 463. Tensor and exterior algebra. Flat, free and projective modules. Localization. Gröbner Bases. Integrality. Chain conditions. Noetherian and Artinian rings. Dedekind domains.
3. **Further Galois Theory:** Inverse limits; infinite Galois theory.
4. **Rudimentary Algebraic Geometry:** The category of affine schemes. Hilbert Nullstellensatz.
5. **Homological Algebra:** Complexes; homology. Injective modules and derived functors. Ext and Tor. Time permitting: the Koszul complex.